Claims

[c1]   1. A method for analyzing packetized network traffic
comprising the steps of:
a. receiving a copy of said network traffic comprising one
or more streams;
b. filtering said received network traffic to isolate at least
one stream from said one or more streams; and
c. forwarding packetized data corresponding to said at
least one isolated stream to a native streaming interface,
said native streaming interface providing minimum time
distortion as compared to said network traffic to permit
media stream analysis and monitoring to indicate said
network's influence on said at least one isolated stream
and measure said at least one isolated stream's confor-
mance to a pre-determined stream standard.

[c2]   2. A method for analyzing packetized network traffic, as
per claim 1, wherein said method further comprises the
steps of:
a. computing statistics associated with each isolated
stream, said statistics comprising at least a delay factor
(DF) parameter defining an instantaneous flow rate bal-
ance representing a virtual buffer delay that is needed to

prevent data loss and absorb network jitter growth; and

b. forwarding, for each isolated stream, said computed statistics to a data consumer.

[c3] 3. A method for analyzing packetized network traffic, as per claim 2, wherein said computed statistics additionally comprises a media loss rate (MLR) parameter representing number of media packets lost or corrupted.

[c4] 4. A system for analyzing packetized network traffic comprising:

a. one or more interfaces to forward a copy of said network traffic comprising one or more streams;

b. one or more filters to receive and filter said forwarded network traffic to isolate at least one stream from said one or more streams; and

c. a native streaming interface to receive packetized data corresponding to said at least one isolated stream, said native streaming interface providing minimum time distortion to permit media stream analysis and monitoring to indicate said network's influence on said at least one isolated stream and measure said at least one isolated stream's conformance to a pre-determined stream standard.

[c5] 5. A system for analyzing packetized network traffic, as per claim 4, said system further comprising:

a. a compute engine to compute statistics associated with said at least one isolated stream, said statistics for each stream comprising at least a delay factor (DF) defining an instantaneous flow rate balance representing a virtual buffer delay that is needed to prevent data loss and absorb network jitter growth; and

b. one or more interfaces to forward said computed statistics for said one or more streams of interest to a data consumer.

[c6] 6. A system for analyzing packetized network traffic, as per claim 5, wherein said computed statistics additionally comprise a media loss rate (MLR) parameter, said MLR representing number of media packets lost or corrupted.

[c7] 7. A method for analyzing packetized network traffic comprising one or more streams, said method comprising the steps of:

a. receiving said network traffic comprising one or more streams;

b. filtering said received network traffic and isolating at least one stream from said one or more streams;

c. computing statistics associated with each isolated stream, said statistics comprising at least a delay factor (DF) parameter defining an instantaneous flow rate balance representing a virtual buffer delay that is needed to

prevent data loss and absorb network jitter growth; and

d. forwarding, for each isolated stream, said computed statistics to a data consumer.

[c8] 8. A method for analyzing packetized network traffic comprising one or more streams, as per claim 7, wherein said computed statistics additionally comprise a media loss rate (MLR) parameter representing number of media packets lost or corrupted.

[c9] 9. A method for analyzing packetized network traffic comprising one or more streams, as per claim 7, wherein said method further comprises the step of encoding said computed statistics prior to forwarding.

[c10] 10. A method for analyzing packetized network traffic comprising one or more streams, as per claim 9, wherein said encoding is any of the following: encrypting, compressing, or converting code format.

[c11] 11. A method for analyzing packetized network traffic comprising one or more streams, as per claim 7, wherein said method further comprises the step of recovering control information associated with said one or more streams and forwarding said recovered control information to said data consumer.

[c12] 12. A method for analyzing packetized network traffic

comprising one or more streams, as per claim 7, wherein said method further comprises the step of forwarding a warning to said data consumer if, for each of said isolated streams, said computed statistics exceeds a predetermined threshold or rate of change.

[c13] 13. A method for analyzing packetized network traffic comprising one or more streams, as per claim 7, wherein bandwidth for said received network traffic is allotted in an on-demand manner.

[c14] 14. A method for analyzing packetized network traffic comprising one or more streams, as per claim 13, wherein bandwidth for forwarding said computed statistics to said data consumer is allotted in an on-demand manner by increasing said bandwidth usage when computed statistics indicate a warning.

[c15] 15. A method for analyzing packetized network traffic comprising one or more streams, as per claim 7, wherein said computed statistics additionally comprise any of the following: stream instantaneous bit-rate, average bit-rate, deviation from nominal bit-rate, minimum and maximum deviation from nominal bit-rate, instantaneous flow rate, minimum and maximum instantaneous flow rate, instantaneous flow rate deviation, minimum and maximum instantaneous flow rate deviation, stream

utilization of network bandwidth, minimum and maximum of stream utilization of network bandwidth, or number of sequence errors.

[c16] 16. A method for analyzing packetized network traffic comprising one or more streams, as per claim 15, wherein said method further comprises the step of displaying said computed statistics.

[c17] 17. A method for analyzing packetized network traffic comprising one or more streams, as per claim 14, wherein the number of said computed statistics or a rate at which said statistics are computed is reduced during benign network conditions and increased for detailed analysis of each of said isolated streams.

[c18] 18. A method for analyzing packetized network traffic comprising one or more streams, as per claim 7, wherein said instantaneous flow rate balance value is computed from said each isolated stream via a counter computing an instantaneous flow rate and said counter registers a deviation from nominal as an indication of the flow"s instantaneous accumulated jitter for forwarding to said data consumer.

[c19] 19. A method for analyzing packetized network traffic comprising one or more streams, as per claim 18,

wherein said instantaneous flow rate balance value is periodically cleared to avoid monotonically increasing values due to differences in calculated bit rate values caused by offset or drift in frequency in a local clock source.

[c20] 20. A method for analyzing packetized network traffic comprising one or more streams, as per claim 7, wherein said statistics are calculated with a local clock source which is derived by a hardware or software phase locked loop or a hardware or software delay-locked loop to avoid monotonically increasing values due to differences in expected bit rate values caused by offset or drift in frequency in said local clock source.

[c21] 21. A method for analyzing packetized network traffic comprising one or more streams, as per claim 7, wherein said method further comprises the step of implementing a quality of service (QOS) metering scheme based upon adjusting traffic priority between said forwarded computed network statistics and said streaming network traffic.

[c22] 22. An article of manufacture comprising computer usable medium having computer readable program code embodied therein which analyzes packetized network traffic comprising one or more streams, said medium

comprising:

a. computer readable program code aiding in receiving said network traffic comprising one or more streams;

b. computer readable program code filtering said received traffic and isolating at least one stream from said one or more streams;

c. computer readable program code computing statistics associated with each isolated stream, said statistics comprising at least a delay factor (DF) parameter defining an instantaneous flow rate balance representing a virtual buffer delay that is needed to prevent data loss and absorb network jitter growth; and

d. computer readable program code aiding in forwarding said computed statistics to a data consumer.

[c23] 23. An article of manufacture comprising computer usable medium having computer readable program code embodied therein which analyzes packetized network traffic comprise one or more streams, as per claim 22, wherein said computed statistics additionally comprises a media loss rate (MLR) parameter representing number of media packets lost or corrupted.

[c24] 24. An article of manufacture comprising computer usable medium having computer readable program code embodied therein which analyzes packetized network traffic comprising one or more streams, as per claim 22,

wherein said medium further comprises computer readable program code encoding said computed statistics prior to forwarding.

[c25] 25. An article of manufacture comprising computer usable medium having computer readable program code embodied therein which analyzes packetized network traffic comprising one or more streams, as per claim 22, wherein said medium further comprises computer readable program code aiding in forwarding a warning to said data consumer if, for each isolated stream, said computed statistics exceeds a predetermined threshold or rate of change.

[c26] 26. An article of manufacture comprising computer usable medium having computer readable program code embodied therein which analyzes packetized network traffic comprising one or more streams, as per claim 22, wherein said medium further comprises computer readable program code displaying said computed statistics.

[c27] 27. A system analyzing packetized network traffic comprising one or more streams, said system comprising:
a. one or more network interfaces to receive streaming network traffic associated with said one or more streams;
b. a filter and compute engine to filter one or more

streams of interest in said one or more streams and compute statistics associated with said one or more streams of interest, said statistics for each stream comprising at least a delay factor (DF) defining an instantaneous flow rate balance representing a virtual buffer delay that is needed to prevent data loss and absorb network jitter growth for said stream; and

c. one or more interfaces to forward said computed statistics for said one or more streams of interest to a data consumer.

[c28]   28. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein said computed statistics additionally comprise a media loss rate (MLR) parameter representing number of media packets lost or corrupted.

[c29]   29. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein said system further comprises an encoder encoding said computed statistics prior to transmission to said data consumer.

[c30]   30. A system analyzing packetized network traffic comprising one or more streams, as per claim 29, wherein said encoding is any of the following: encrypting, compressing, or converting code format.

[c31] 31. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein said network is based on any one of the following architectures: 802.3, 802.4, 802.5, USB, ATM, SONET, Fibrechannel, Firewire or IEEE 1394, Infiniband, Bluetooth, 802.11, 802.15, 802.16, 802.17, ZigBee, or DVB–ASI.

[c32] 32. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein said instantaneous flow rate balance value is computed from said one or more streams of interest via a counter computing an instantaneous flow rate and said counter registers a deviation from nominal as an indication of the flow"s instantaneous accumulated jitter for forwarding to said data consumer.

[c33] 33. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein said instantaneous flow rate balance value is periodically cleared to avoid monotonically increasing values due to differences in calculated bit rate values caused by offset or drift in frequency in a local clock source.

[c34] 34. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein said network statistics are calculated with a local clock

source which is derived by a hardware or software phase locked loop or a hardware or software delay-locked loop to avoid monotonically increasing values due to differences in expected bit rate values caused by offset or drift in frequency in said local clock source.

[c35] 35. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein said one or more interfaces forward said computed statistics to a data consumer in an in-band manner by sharing network transmission bandwidth between said streaming network traffic and computed statistics.

[c36] 36. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein a quality-of-service (QOS) metering scheme is implemented based upon adjusting traffic priority between said computed statistics and said streaming network traffic.

[c37] 37. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein frequency of said computed statistics to be forwarded is scaled linearly with bandwidth associated with said one or more interfaces used to forward said computed statistics.

[c38] 38. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein at least one of said interfaces is a native streaming video interface forwarding a streaming media payload, said native streaming video interface providing minimum time distortion to permit media stream analysis and monitoring by a native streaming media analyzer.

[c39] 39. A system analyzing packetized network traffic comprising one or more streams, as per claim 27, wherein said filter and compute engine filters debugging or operational statistics from streaming media processor equipment and provides the data directly, or computes a set of reduced data, for transmission to a management system or directly to a user.

[c40] 40. A system analyzing packetized network traffic comprising one or more streams, said system comprising:
a. one or more network interfaces to receive streaming network traffic associated with said one or more streams;
b. one or more filters to filter one or more streams of interest in said one or more streams;
c. a compute engine comprising one or more finite state machines to compute index values associated with said one or more streams of interest, said index values for each stream comprising at least a delay factor (DF) and a

media loss rate (MLR), said DF defining an instantaneous flow rate balance representing a virtual buffer delay that is needed to prevent data loss and absorb network jitter growth for said stream, and said MLR representing number of media packets lost or corrupted for said stream; and

d. one or more interfaces to forward said computed index values for said one or more streams of interest to a data consumer.

[c41] 41. A system analyzing packetized network traffic comprising one or more streams, as per claim 40, wherein said system further comprises an encoder encoding said computed index values prior to forwarding to said data consumer.

[c42] 42. A system analyzing packetized network traffic comprising one or more streams, as per claim 40, wherein said system further comprises a controller to transmit control instructions from said data consumer to modify system-level state-based logic data associated with said one or more finite state machines.

[c43] 43. A system analyzing packetized network traffic comprising one or more streams, as per claim 40, wherein said system further comprises a display for rendering said computed statistics.

[c44] 44. A system analyzing packetized network traffic comprising one or more streams, as per claim 40, wherein said network is based on any one of the following architectures: 802.3, 802.4, 802.5, USB, ATM, SONET, Fibrechannel, Firewire or IEEE 1394, Infiniband, Bluetooth, 802.11, 802.15, 802.16, 802.17, ZigBee, or DVB–ASI.

[c45] 45. A system analyzing packetized network traffic comprising one or more streams, as per claim 40, wherein a quality–of–service (QOS) metering scheme is implemented based upon adjusting traffic priority between said computed index values and said streaming network traffic.

[c46] 46. A system analyzing packetized network traffic comprising one or more streams, as per claim 40, wherein frequency of said computed index values to be forwarded is scaled linearly with bandwidth associated with said one or more interfaces used to forward said computed index values.

[c47] 47. A system analyzing packetized network traffic comprising one or more streams, as per claim 40, wherein at least one of said interfaces is a native streaming video interface forwarding a streaming media payload, said native streaming video interface providing minimum

time distortion to permit media stream analysis and
monitoring by a native streaming media analyzer.